

**AMENDMENTS TO CLAIMS**

1. (Original) A gas purification system comprising:

a reactor having a reactor volume and a reactor wall, the reactor wall having an interior side and an exterior side, and defining a communicating portal therebetween for a mixed gas flow;

a heat conduit within the reactor volume having a conduit wall, the conduit wall having an interior side and an exterior side, and defining a channel therethrough for passing a heated material through the reactor volume;

a reaction catalyst coating in contact with the exterior side of the conduit wall;

a gas selective membrane within the reactor volume disposed between the reactor wall and the conduit wall, said gas membrane in contact with the mixed gas flow and selectively passing a constituent gas of the mixed gas flow therethrough, such that a raffinate of the mixed gas flow is retained in contact with said membrane;

an outlet channel for removing said raffinate from contact with said selective membrane;

and

a passageway for the removal of the constituent gas from the interior of said reactor.

2. (Original) The gas purification system of claim 1 further comprising a reactor heater.

3. (Original) The gas purification system of claim 1 further comprising a combustion catalyst in contact with the interior side of said conduit wall.

4. (Original) The gas purification system of claim 1 wherein a gap space exists between said reaction catalyst coating and said membrane.

5. (Original) The gas purification system of claim 3 wherein the gap space ranges from 0.05 inch to 1.0 inch.

6. (Original) The gas purification system of claim 3 wherein the space comprises a laminar flow disruptor.

7. (Original) The gas purification system of claim 6 wherein the flow disruptor is selected from the group consisting of: packing, particulate, mesh wire, wool, granule, pellet and fluidized catalyst.

8. (Original) The gas purification system of claim 1 further comprising a heat transfer element in thermal contact with at least one object selected from the group consisting of: said heat conduit and said membrane.

9. (Original) The gas purification system of claim 8 wherein the heat transfer element is a fin.

10. (Original) The gas purification system of claim 9 wherein the fin is coated with a reaction catalyst.

11. (Original) The gas purification system of claim 10 wherein the fin has a gas communication aperture therethrough.

12. (Original) The gas purification system of claim 1 further comprising a combustion catalyst on an exterior wall of a feed tube.

13. (Original) The gas purification system of claim 1 further comprising a flow disruptor with said reactor selected from the group consisting of: a dimple, a protrusion, packing, mesh wire, wool, granulate, pellet catalyst, fluidized catalyst, a baffle and a curved membrane.

14. (Previously Presented) The gas purification system of claim 2 wherein said heater has flowing therein a sweep gas.

15. (Original) The gas purification system of claim 1 further comprising feed liquid compression means to convey the mixed gas flow through the portal into said reactor.

16. (Original) The gas purification system of claim 1 further comprising a plurality of said membrane.

17. (Original) The gas purification system of claim 1 wherein the membrane is hydrogen selective and the constituent gas is hydrogen.

18. (Original) The gas purification system of claim 1 wherein the catalyst coating comprises a methanol reforming catalyst.

19. (Original) The gas purification system of claim 1 wherein the catalyst coating comprises an ammonia cracking catalyst.

20. (Original) A gas purification system comprising:  
a reactor operating above room temperature having a reactor volume and a reactor wall, the reactor wall having an interior side and an exterior side, and defining a communicating portal therebetween for a mixed gas flow;  
a gas selective membrane within the reactor volume, said gas membrane in contact with the mixed gas flow and selectively passing a constituent gas of the mixed gas flow therethrough, such that a raffinate of the mixed gas flow is retained in contact with said membrane;  
an outlet channel for removing said raffinate from contact with said selective membrane;  
a raffinate compressor disposed in fluid communication with said outlet channel; and  
a passageway for the removal of the constituent gas from the interior of said reactor.

21. (Original) The gas purification system of claim 20 wherein the raffinate compressor is a venturi.

22. (Original) The gas purification system of claim 20 further comprising a fuel cell powered by the constituent gas.

23. (Original) The gas purification system of claim 20 wherein the passageway is brazed to the feed conduit.

24. (Original) A gas purification system comprising:  
a gas selective membrane within the reactor volume, said gas membrane in contact with the mixed gas flow and selectively passing a constituent gas of the mixed gas flow therethrough, whereby a raffinate of the mixed gas flow is retained in contact with said membrane;  
an outlet channel for removing said raffinate from contact with said selective membrane;  
and  
a passageway for the removal of the constituent gas from the interior of said reactor.

25. (Original) The gas purification system of claim 20 having at least one component coupled thereto, said component being selected from a group consisting of: a raffinate burner, a mixed gas flow feed pump, a raffinate back pressure controller, and an oxygen sensor.

26. (Original) A gas purification system comprising:  
a reactor operating above room temperature having a reactor volume and a reactor wall, the reactor wall having an interior side and an exterior side, and defining a communicating portal therebetween for a mixed gas flow;  
a first reaction catalyst and a second reaction catalyst within said reactor volume;  
a gas selective membrane within the reactor volume, said gas membrane in contact with the mixed gas flow and selectively passing a constituent gas of the mixed gas flow therethrough, such that a raffinate of the mixed gas flow is retained in contact with said membrane;

an outlet channel for removing said raffinate from contact with said selective membrane;  
and  
a passageway for the removal of the constituent gas from the interior of said reactor.

27. (Original) The gas purification system of claim 26 wherein the first catalyst is a high temperature catalyst and the second catalyst is a low temperature catalyst.

28. (Original) The gas purification system of claim 26 wherein the first and second catalysts are differentially distributed along a temperature gradient within said reactor.

29. (Currently Amended) A gas purification system comprising:  
a feed pump;  
~~a reactor for providing hydrogen at a hydrogen output pressure~~ reactor-purifier system for generated purified hydrogen and a raffinate stream from a feed, the feed provided by said feed pump;  
~~a feed pump rate controller operating said feed pump in response to the hydrogen output pressure and a raffinate output pressure;~~  
a burner for combusting ~~[[a]] the~~ raffinate produced by said ~~reactor~~ reactor-purifier system to yield a heated exhaust gas, heat from said burner being used to heat said reactor-purifier system;  
a back pressure regulator intermediate between said reactor and said burner and regulating flow of said raffinate therebetween; and  
a source of air mixed with said raffinate before combustion in said burner.

30. (Previously Presented) The system of claim 29 further comprising a mix controller adjusting the ratio of said raffinate in said air provided to said burner.

31. (Previously Presented) The system of claim 30 further comprising an oxygen sensor to adjust the amount of said raffinate relative to the amount of said source of air delivered to said burner.

32. (Previously Presented) The system of claim 29 further comprising a fuel cell receiving the hydrogen from said reactor.

33. (Currently Amended) The system of claim 29 wherein said ~~reactor is the reactor~~ reactor-purifier system is the membrane reactor gas purification system of claim 1.

34. (New) A feed pump controller operating on the system of claim 29, such that feed rate is adjusted in response to hydrogen output pressure.

35. (New) The system of claim 29 further comprising a means for combining additional fuel with the raffinate flow to the burner; additional fuel being used for startup and, to a lesser extent, for ordinary operation.

36. (New) The system of claim 35 further comprising a fuel flow controller which adjusts the rate of additional fuel flow in response to the temperature of said reactor-purifier system.

37. (New) The system of claim 29 wherein said reactor-purifier system comprises a separate reactor and a purifier system.

38. (New) The system of claim 29 where said heated material is a condensing heat transfer fluid.